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ISSN 0543-5846
METABK 54(3) 563-566 (2015)
UDC – UDK 669.015:657.21:347.725:338.93:498=111

# CORRELATIONS BETWEEN INDEBTNESS GRADE AND THE VALUE OF COMPANIES IN METALLURGICAL INDUSTRY OF ROMANIA

Received – Prispjelo: 2014-10-01
Accepted – Prihvaćeno: 2015-01-30
Preliminary Note – Prethodno priopćenje

The purpose of this paper is to identify the influence of degree of indebtedness, the level of equity capital and the net result on the value of metallurgical companies, represented by their market value. The paper presents a model developed based on data of 10 companies listed on the Bucharest Stock Exchange (BSE) in the period 2004-2013, which operates in the metallurgical industry in Romania.

*Key words:* metallurgical industry, degree of indebtedness, share price, net income, Romania

## INTRODUCTION

The activity of the companies involves the use of an ensemble of financial resources. Its creation, respectively the establishment of a financial structure represent a decision that aims the optimizing of the assumed report between rentability and risk. The financing decision impose the substantiation of a report between equity and borrowed, between short-term debt (which enables rapid procurement of resources needed for enlarging or reducing the volume of activity) and use of permanent capital (less expensive), between borrowed resources and the total value of the assets used (a high degree of indebtedness may cause difficulties in paying outstanding amounts and ensuring the financial performance), so that obtained results assure the increase of firm value. Many studies realized to identify the correlation between financial structure and the value of a firm have the starting point Modigliani and Miller's theory, known as ,,the capital structure irrelevance principle", which claims the neutrality of financial structure. The registered results are different in terms of identified effects. Thus, it is considered that a moderate level of debt of firms improves well-being and stimulates growth, and vice versa, in the case of a high level [1]. Increasing the level of debt can generate a liquidity crisis. Also, short-term debt and total debt have a negative impact on the Return on Assets (ROA) [2], and the return on equity (ROE) HAD Significant relationship with short-term Debt, Long-term Debt and Total Debt [3]. The level of debt can influence the productivity of firms. Thus, a reasonable level of debt in the capital structure of the SMEs helped to improve their productivity [4]. Another study showed that here was no significant difference to the impact of the financial leverage between high financial leverage firms and low financial leverage firms on their performance [5]. With regard to the relationship between total debt and return rates, has been identified a significant positive association between the ratio total debt to total assets and return on equity [6].

In the context of previous specifications, considering the fact that in metallurgy is running a significant amount of capital and the level of debt is high, we considered that an appropriate analysis of indebtedness on the market value of companies within this industry. In addition, we have reported to the influence of the value of the equity and the net result for the year (determined after including financial expenses arising from loans), considering that investors are interested and the possibility of remuneration of equity, not only the quality of co-owner of the company. Obviously, the analysis and the results achieved are determined by the peculiarities of metallurgical sector in Romania. Thus, although it is an important sector of the national economy, both in terms of the large number of jobs provided and the revenue generated to the budget, bankruptcy risk is extremely high [7]. Moreover, an analysis of EBIT indicator (Earning Before Interest and Taxes) cumulatively for 52 of the largest companies which are operating in the metallurgical sector in Romania demonstrates the negative impact of financial expenses on the financial result for the year. So, after 2009, it is noted the systematic recording of a negative result, which manifested decreasing tendency reversed after 2010, in 2013 the total registered loss of the 52 firms was - 218 182 euros, with 116 % higher than the previous year.

## RESEARCH METHODOLOGY

Using the multifactor regression model it was analyzed the interdependence between the market value of

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the shares of companies from the metallurgy sector, listed on the BSE and a number of independent variables. The approach which has been used in this research is purely judgmental, being one in which was primarily used the intuition to pick factors and then there was estimated the loadings factor and checked whether they explain the cross-sectional variations in estimated expected asset prices. Then, those hypothesised factors were been regressed to obtain estimates of the loadings factor.

Information or data were collected using a representative sample of the companies trading at the BSE from metallurgical sector. The data consist of 10 traded stocks from the Bucharest Stock Exchange, covering the period from 2003 to 2013 [8].

The specification of factors is essentially empirical in nature. Several a priori guidelines as to the characteristics required of potential factors are, however, suggested: their impact on asset prices manifests in their *unexpected* movements;they should represent *undiversifiable* influences (these are, clearly, more likely to be macroeconomic rather than firm-specific in nature); timely and accurate information on these variables is required; the relationship should be theoretically justifiable on economic grounds. When selecting the variables, they have been chosen using the criterion that they should affect the asset prices.

The data set includes the dependent variable - considered share price and the independent variables considered, namely: F1 - indebtedness degree; F2 - value of equity ratio; F3 - net income. We discuss first the rationality behind choosing these factors.

Table 1 displays the correlation matrix among the independent variables:

Table 1 **The correlation matrix of the variables**

| | | I_d | E_r | N_i |
|---|---|---|---|---|
| I_d | Pearson Correlation | 1 | - 0,844** | - 0,100 |
| E_r | Pearson Correlation | - 0,844** | 1 | - 0,030 |
| N_i | Pearson Correlation | - 0,100 | - 0,030 | 1 |
| **Correlation is significant at the - 0,01 level (2 - tailed). | | | | |

where: I_d - indebtedness degree; E_r - equity value; N_i - the net income.

Most of the correlations are not large except the one between the equity and indebtedness degree, because usually they are negatively correlated since they both refer to the funding policy of the company.

The resulting collinearity tends to weaken the individual impact of these variables. The other correlations are negligible and the variables are far from being perfectly correlated, and no one variable can be substituted for any other.

## ESTIMATING THE PARAMETERS OF THE MODEL

In the following analysis, the effect variable (the dependent variable) was taken as the share prices, and from the many influence factors there were considered as causal factors which can be quantified at microeconomic level, the following: indebtedness degree, equity value, the net income. Since the pattern of points in most of the above graphics suggests a straight line, we specify the model as follows:

$$Sp = \beta 0 + \beta 1 I_d + \beta 2 E_r + \beta 3 N_i \quad (1)$$

Where: Sp (share price) is the dependent variable, $I_d$, $E_r$, $N_i$ are the independent variables and $\beta 0,\ldots,\beta 4$ are the coefficients. Using the 10 - year data, we obtain the following results for the function's parameters (Table 2).

Table 2 **Value of the parameters for the regression function**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Sp | 0,626138 | 4,311606 | 0,145221 | 0,8886 |
| I_d | - 0,011530 | 0,052593 | - 0,219237 | 0,8327 |
| E_r | 1,70E-08 | 9,06E-09 | 1,872651 | 0,1033 |
| N_i | 6,25E-09 | 9,47E-09 | 0,660265 | 0,5302 |
| R-squared | 0,693452 | Mean dependent var | | 3,6271 |
| Adjusted R-squared | 0,562074 | S,D, dependent var | | 1,5884 |
| S,E, of regression | 1,051148 | Akaike info criterion | | 3,2129 |
| Sum squared resid | 7,734389 | Schwarz criterion | | 3,3576 |
| Log likelihood | - 13,67112 | Hannan-Quinn criter, | | 3,1217 |
| F-statistic | 5,278305 | Durbin-Watson stat | | 2,0193 |
| Prob(F-statistic) | 0,032386 | | | |

To know the exact influence exercised by the indebtedness degree, equity value, the net income on the share price, i.e, to know the trend and intensity of the relationship between each two indicators, we calculate the Pearson's correlation coefficient (Table 3).

Table 3 **Pearson's correlation coefficient**

| | | I_d | E_r | N_i | Sp |
|---|---|---|---|---|---|
| | Pearson Correlation | -0,733* | 0,817** | 0,128 | 1 |
| | Sig, (2-tailed) | 0,010 | 0,002 | 0,707 | |
| **, Correlation is significant at the 0,01 level (2-tailed), | | | | | |
| *, Correlation is significant at the 0,05 level (2-tailed), | | | | | |

An econometric model confirms the expectations concerning the adopted linear function if the $R^2$ degree of determination is close to the value of 1 (100 %), and the verification of the significance of every factor's role in the dependent variable is made through the F test, which confirms or refutes the model.

For the model we developed, the values for the $R^2$ and the F test are presented below (Tables 4 and 5).

This means that almost 70 % of the variation in asset prices is explained by the three independent variables, while 30 % remains unexplained, we observe that the model confirms the expectations concerning the linear function because the R 2 degree of determination is close to the value of 1.

Furthermore, to test the statistical power of the model we used the F test, the test t and the variable Durbin-Watson. In order to see if the variation of dependent

Table 4 **The $R^2$ coefficient of determination**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0,833[a] | 0,693 | 0,562 | 1,05115 |
| a. Predictors: (Constant), N_i, E_r, I_d | | | | |
| b. Dependent Variable: Sp | | | | |

Table 5 **ANOVA[b]**

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 17,496 | 3 | 5,832 | 5,278 | 0,032[a] |
| Residual | 7,734 | 7 | 1,105 | | |
| Total | 25,231 | 10 | | | |
| a. Predictors: (Constant), N_i, E_r, I_d<br>b. Dependent Variable: Sp | | | | | |

variable could be explained, we have to test the following hypotheses:

H0: $\beta1 = \beta2 = \beta3 = \beta4 = \beta5 = \beta6 = 0$ (2)

HA: At least one $\beta i$ is not equal to zero (3)

If the null hypothesis is true, none of the independent variables are linearly related to dependent one, and therefore the model is useless. If at least one $\beta i$ is not equal to zero, the model does have some utility.

The calculation of the test statistic is summarized in an analysis of variance table (ANOVA), which appears as follows in Table 5.

A first test of the model was performed via t test (Table 2), taking into account the statistic safety and there were compared the data displayed by the application with the one of the theory. The following conclusions were identified: for the variable equity is not rejected the null hypothesis as t calculated (1,873) > t table (t 0,05 n - 2 = 1,833) and for variables of indebtedness and net income null hypothesis is rejected because t calculated (- 0,219, respectively 0,660) < t table, as a rule we applied in estimations, considering a relevant level for t-statistic of 5 %, if the probability attached to t for the coefficient of the independent variable is below this level, this coefficient is considered significant from statistically point. If p is large, then the coefficient is, statistically, zero. The value obtained of probability of t for the coefficients of the independent variables, indebtedness and net income is higher than the relevant level considered for t-statistic of 5 %, indicating that these variables do not contribute much to the model,

A large value of F indicates that most of the variation of dependent variable is explained by the regression equation and that the model is good, The rejection region allows us to determine whether F is large enough to justify our rejecting H0, For our test, the rejection region is: F > F,05,3,7, Since Fcalculated = 5,27 is superior to the corresponding table value (regarding the percentage points of the F distribution, $\alpha = 0,5$) (F,05,3,7 is 4,35), we can say with a 5 % error risk, that estimates are in general significantly different from zero, and that the whole model is valid, the more likely the F-test probability is less than the relevant level (5 %), so at least one of the coefficients is, statistically, significant.

If the linear model is correctly specified (succeeded to extract all of the signals from the data), then there must not exist linking between errors (errors should not be autocorrelated with the previous). A residual is the difference between the observed and model-predicted values of the dependent variable, The residual for a given product is the observed value of the error term for that product, in the case of a performant model, well specified, correctly estimated, residual values are randomly chosen and uncorrelated, so that autocorrelation coefficients calculated for these values are insignificant, in order to verify the hypothesis of independence of errors it was calculated the value of variable Durbin-Watson: 2,019. For a significance level of 0,5 % of the Durbin-Watson distribution table were taken values where n = 11, resulting d1 = 0,595, d2 = 1,928. The analysis showed that there is a significant linear correlation of the first order at the level of the residue series (the lack of autocorrelation respect the hypothesis of homoskedasticitate for the residual variable).

The histogram and the P-P plot of the residuals (presented in the two tables below) help us to check the assumption of normality of the error term, Figure 1. Also to study the normality, we used the following indicators: Kurtosis (coefficient of flattening), Skewness (asymmetry coefficient) and Jarque - Bera.

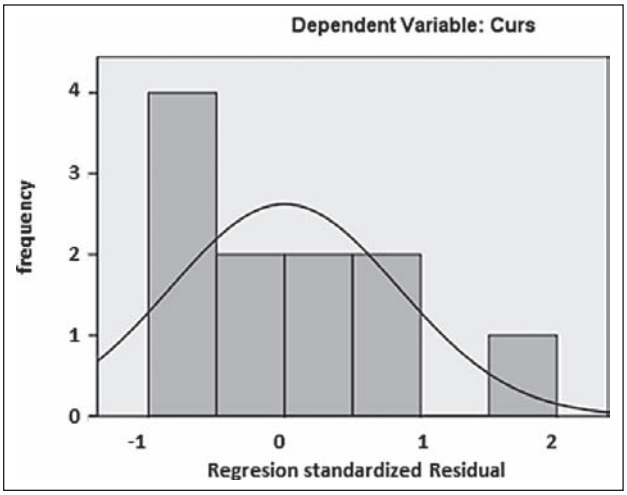


**Figure 1** Histogram and the P-P plot of the residuals

## CONCLUSIONS

The results recorded from the performed research converge to the conclusion that the level of indebtedness is an important factor influencing the market value of companies from the metallurgical industry.

From the realized researches the following aspects can be observed:

- between indebtedness degree and the share prices there is a opposite relation of high intensity, acting indirectly on share prices, decreasing the investor interest in the market for issuing companies. The

growth of the indebtedness degree will determine the decrease of the share prices;

- between the equity and the share prices there is a positive relation of higher intensity, which means that the growth of the first will determine the increase of these prices;
- a near to zero correlation coefficient is available between net income and the share prices, showing a relation of low intensity, which means that there is almost no correlation between the two variables;
- It is noted that the financing structure of the company has a strong impact on the evolution of the market value of the shares, with implications on the decreasing of impact on its net income.

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**Note**: The responsibles for English language is S.C. Purtrad S.R.L., Târgu Jiu, Romania